(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 069 790 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.01.2001 Bulletin 2001/03

(51) Int. Cl.[7]: **H04Q 7/22**, H04Q 7/36, H04Q 7/38

(21) Application number: **00305798.1**

(22) Date of filing: **10.07.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **10.07.1999 KR 9927896**

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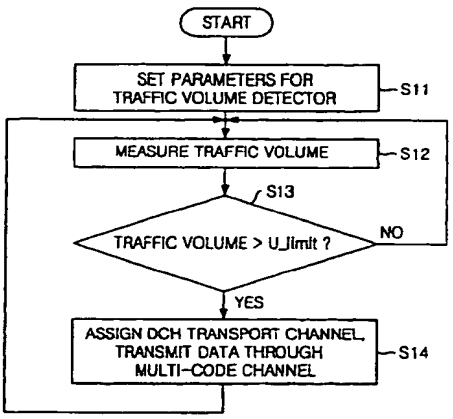
(54) Method and apparatus for dynamically assigning channel in asynchronous mobile communication system

(57) Method and apparatus for assigning a channel dynamically in asynchronous mobile communication system are disclosed. The method for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the method comprising the steps of: a) measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel; b) determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and c) if the traffic volume of the data packets for a mobile station is larger than the predetermined value, assigning a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data packets for the mobile station via the DCH transport channel.

FIG. 5



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EP 1 069 790 A2

Description

[0001] The present invention relates to a method and apparatus for assigning a channel in a mobile communication system; more particularly, relates to a method and apparatus for dynamically assigning a channel in an asynchronous mobile communication system when transmitting radio data packets from a base station to a mobile station (as is referred to "downlink").

[0002] Fig. 1 is a block diagram of a channel assigning device in a conventional mobile communication system.

[0003] The mobile communication system includes a mobile station 10, a radio access network controller 20, a base transceiver station 30 and a mobile switching center 40.

[0004] The mobile station 10 includes a layer 1, a layer 2 and a layer 3. The layer 3 includes a call control/mobility management (CC/MM) entity 12 and a radio resource control (RRC) layer 14. The layer 2 includes a radio link control (RLC) layer and a medium access control (MAC) layer. The layer 1 includes physical layer 16 having a channel element 18. In substantial, the call control entity 12, the radio resource control layer 14 and the channel element 18 assigns a channel for transmitting signal.

[0005] The radio access network controller 20 includes a physical layer, a MAC layer, a RLC layer, a RRC layer 24 and a CC/MM entity 22.

[0006] The base transceiver station 30 includes a physical layer having a channel element 32.

[0007] The mobile switching center 40 includes a physical layer, a MAC layer, a RLC layer, a RRC layer and a CC/MM entity 42.

[0008] In general, a downlink shared channel (DSCH) is used when transmitting radio data packets from a base station to a mobile station in an asynchronous mobile communication system. A common packet channel (CPCH) is used when transmitting radio data packets from a mobile station to a base station in an asynchronous mobile communication system.

[0009] The DSCH transport channel and the CPCH transport channel are assigned in the RRC layer of the UTRAN. Each channel configuration is performed in the RRC layer. The channel configuration means that channel information elements, for example, a scrambling code, a spreading factor and a data rate of the assigned channel, are selected.

[0010] Fig. 2 is a diagram showing a conventional DSCH transport channel.

[0011] Referring to Fig. 2, the DSCH transport channel is shared by a plurality of the mobile stations when transmitting data packets from the UTRAN to the MS 10. Each of the mobile stations has different quality of service, data rate and traffic volume.

[0012] The data rate means an amount of transmitted data per a second. In general, a mean data rate and a maximum data rate are specified before call setup.

[0013] The traffic volume means an amount of data transmitted through a channel or a buffer for a predetermined period. In other words, the traffic volume is described with respect to data transmission capacity of the channel or the buffer.

[0014] When the DSCH transport channel is shared by a plurality of mobile stations, if the traffic volume of data for to one mobile station is increased, data inputted later are considerably delayed.

[0015] In order to solve such problem, a conventional mobile communication system uses a spreading factor reduction method. However, reduction of the spreading factor increases transmission power (about twice). Increased transmission power acts as interference to signals for the neighbor mobile stations, to thereby fall quality of communication service.

[0016] Therefore, it is an aim of the present invention to provide a method and apparatus for dynamically assigning a channel in an asynchronous mobile communication system when transmitting radio data packets on downlink, thereby guaranteeing the quality of service for each user.

[0017] In accordance with an aspect of the present invention, there is provided a method for assigning a channel dynamically in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the method comprising the steps of: a) measuring traffic volume of data packets for each of the mobile stations and to be inputted to the DSCH and the DCH transport channels; b) determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and c) assigning an additional DSCH transport channel to the mobile station to receive data packets of which traffic volume increases, if the traffic volume of the data packets is larger than the first predetermined value.

[0018] In accordance with another aspect of the present invention, there is provided an apparatus for assigning a channel dynamically in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the apparatus comprising: means for measuring traffic volume of data packets for each of the mobile stations and to be inputted to the DSCH and the DCH transport channels; means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and means for assigning an additional DSCH transport channel to the mobile station to receive data packets of which traffic volume increases, if the traffic volume of the data packets is larger than the first predetermined value.

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[0019] The above and other objects and features of the instant invention will become apparent from the following description of preferred embodiments taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block diagram of a channel assigning device in a conventional mobile communication system;
Fig. 2 is a diagram showing a conventional DSCH transport channel;
Fig. 3A is a diagram of protocol layers of a mobile communication system having a volume detector in accordance with the present invention;
Fig. 3B is a block diagram of the volume detector in accordance with the present invention;
Fig. 4A is a diagram of volume detectors where each volume detector measures traffic volume of data for each user and to be inputted to DSCH transport channel;
Fig. 4B is a diagram of a volume detector which measures traffic volume of data for a certain user and to be inputted to DCH transport channel.
Fig. 5 is a flow chart illustrating a method for assigning a channel in accordance with one embodiment of the present invention;
Fig. 6 is an exemplary diagram showing an assignment of a DCH transport channel because of increment of the traffic volume on DSCH transport channel;
Fig. 7 is a flow chart illustrating a method for assigning a channel in accordance with another embodiment of the present invention;
Fig. 8 is an exemplary diagram showing an assignment of another DSCH transport channel because of increment of the traffic volume on DCH transport channel; and
Fig. 9 is an exemplary diagram demonstrating a release of the DCH transport channel because of decrement of the traffic volume on DCH transport channel.

[0020] Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0021] Fig. 3A is a diagram of protocol layers of a mobile communication system having a volume detector in accordance with the present invention.

[0022] The mobile communication system has similar functions as those of mobile communication system in Fig. 1 except that the system has a volume detector. Accordingly, it is assumed that the same reference numeral denotes the same function block.

[0023] The physical layer 16 offers data transport services to higher layers and transfers transport blocks over a radio interface to a mobile station. The channel element 18 performs functions for data transmission, e.g., encoding, modulation and interleaving of data to be transmitted.

[0024] The MAC layer offers data transfer services on logical channels to a higher layer (RLC layer) and on transport channels to a lower layer (the physical layer). The MAC layer is responsible for mapping of the logical channel onto the appropriate transports channel.

[0025] The RLC layer offers data transfer services on primitive to a higher layer and on logical channels to a lower layer (MAC layer). Also, the RLC layer performs an error correction process, a duplicate detection process, a ciphering process and a flow control process of the data.

[0026] The RRC layer 14 offers data transmission services on primitive to a lower layer (RLC layer) and handles a control plane signaling of the layer 3 between a user equipment (UE) and an asynchronous radio network. The RRC layer 14 manages a radio resource. Also, the RRC layer assigns/re-configures/releases the radio resource to user equipment /Universal mobile telecommunication system Terrestrial Radio Access Network (UE/UTRAN).

[0027] The CC entity handles a call control signaling of layer 3 between the UEs and the asynchronous radio network.

[0028] The MM entity handles a mobility management signaling of layer 3 between the UEs and the asynchronous radio network.

[0029] The layers of the mobile station communicate with corresponding layers of UTRAN.

[0030] The reference numeral 20 denotes a radio access network controller including a CC/MM entity 22, a RRC layer 24, a RLC layer, a MAC layer and a physical layer. Functions of the protocol layers are similar to those described above referring to those of the mobile station 10. Accordingly, for the sake of convenience, a detailed description on functions of the protocol layers will be skipped.

[0031] The reference numeral 30 denotes a base transceiver station (BTS). The BTS 30 communicates data with the mobile station 10 through radio channels and includes a channel element. Functions of the protocol layers for a base station are similar to those described above referring to those of the mobile station 10. Accordingly, for the sake of convenience, a detailed description on functions of the protocol layers will be skipped.

[0032] The reference numeral 40 denotes a mobile switching center. Functions of the protocol layers are similar to those described above referring to those of the mobile station 10. Accordingly, for the sake of convenience, a detailed description on functions of the protocol layers will be skipped.

[0033] Though the mobile station 10 is not directly connected to the RNC 20, the mobile station 10 is connected to the RNC 20 in Fig. 1 in order to show that role of the RNC 20 is more important for channel assignment than that of the BS 30. In substantial, the channel assignment is performed in UTRAN including the RNC 20 and the BS 30.

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[0034] The volume detector monitors data (e.g., control signaling data) from the RRC layer to the physical layer and data (e.g., packet data) from the RLC layer to the physical layer.

[0035] Fig. 3B is a block diagram of the volume detector 100 of Fig. 3A. The volume detector 100 includes a measuring unit 102 and a comparator 104.

[0036] The volume detector 100 monitors data packets to be transmitted to the mobile station and measures traffic volume of the data packets in a measuring unit 102. The measuring unit 102 sends the measured traffic volume of the data packets to a comparator 104. The comparator 104 compares the measured traffic volume of the data packets with predetermined values and transmits the comparing result to the RRC layer.

[0037] Fig. 4A is a diagram of volume detectors where each volume detector measures traffic volume of data for each user and to be inputted to DSCH transport channel.

[0038] Referring to Fig. 4A, there are the same number of volume detectors 51 to 50+N as that of mobile stations connected to the UTRAN. Each volume detector measures traffic volume of data for each mobile station and to be inputted to DSCH transport channel.

[0039] Fig. 4B is a diagram of a volume detector which measures traffic volume of data for a certain user and to be inputted to DCH transport channel.

[0040] Input parameters for the volume detector monitoring the traffic volume of the data to inputted to the DSCH and DCH transport channels are as follows:

a) Maximum buffer threshold U_limit
b) Minimum buffer threshold L_limit
c) Traffic descriptor including peak rate, mean rate and packet delay variation.

[0041] The volume detector obtains these parameters from a call admission controller (CAC) (not shown in the drawing) in a radio resource management (RRM) unit of the RRC layer. Dynamic channel assignment and channel switching are performed in accordance with measuring results of the volume detector.

[0042] Fig. 5 is a flow chart illustrating a method for assigning a channel in accordance with one embodiment of the present invention.

[0043] First, parameters for the traffic volume detector, which are described above, are set and stored on a memory device in the traffic volume detector at step S11. The volume detector measures traffic volume of data to be inputted into the DSCH transport channel for a predetermined time at step S12. Also, the volume detector monitors whether the data to be inputted to the transport channel has characteristics of the traffic descriptor set at step S11.

[0044] At step S13, it is determined whether the measured traffic volume is larger than a maximum buffer threshold U_limit. If the measured traffic volume is smaller than the maximum buffer threshold U_limit, the data is transmitted through only the assigned DSCH transport channel.

[0045] If the measured traffic volume of data for a mobile station is larger than the maximum buffer threshold U_limit, at step S14, a DCH transport channel is assigned to the mobile station. The data is transmitted through two transport channels multi-coded.

[0046] The DCH transport channel is assigned to only a mobile station to receive data of which traffic volume is increased. In other words, only when the traffic volume of data for the mobile station is larger than the maximum buffer threshold U_limit, the DCH transport channel is assigned. At least one DCH transport channel can be simultaneously assigned to each user.

[0047] Fig. 6 is an exemplary diagram of transport channels showing an assignment of a DCH transport channel because of increment of the traffic volume on DSCH transport channel.

[0048] The data for a mobile station is transmitted through a DSCH transport channel as illustrated on the left side of Fig. 6. When the traffic volume is increased, in other words, is larger than the maximum buffer threshold U_limit, a DCH transport channel is additionally assigned to the mobile station as described on the right side of Fig. 6.

[0049] Fig. 7 is a flow chart illustrating a method for assigning a channel in accordance with another embodiment of the present invention.

[0050] First, parameters for the traffic volume detector, e.g., the maximum buffer threshold U_limit, the minimum buffer threshold and the traffic descriptor, are set and stored on a memory device in the traffic volume detector at step S21.

[0051] The volume detector measures traffic volume of data to be inputted into the DSCH transport channel for a predetermined time at step S22. Also, the volume detector monitors whether the data to be inputted to the DSCH transport channel has characteristics of the traffic descriptor set at step S21.

[0052] At step S23, it is determined whether the measured traffic volume of the data for a mobile station is larger than a maximum buffer threshold U_limit. If the measured traffic volume of the data for the mobile station is larger than the maximum buffer threshold U_limit, at step S24, an additional DSCH transport channel is assigned to the mobile station and the data is transmitted through the three transport channels, two DSCH and one DCH transport channels which are multi-coded.

[0053] If the traffic volume of the data for the mobile station is not larger than the maximum buffer threshold U_limit, the process continues to step S25 to determine whether the traffic volume of the data is smaller than the minimum buffer threshold L_limit. If the traffic volume is smaller than the minimum buffer threshold L_limit, the assigned DCH transport channel is released and the

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data is transmitted through only the DSCH transport channel to the mobile station at step S26.

[0054] If the traffic volume of the data is larger than the minimum buffer threshold L_limit and smaller than the maximum buffer threshold U_limit, at step 27, the data is transmitted through one DSCH and one DCH transport channels which are already assigned.

[0055] Fig. 8 is an exemplary diagram showing an assignment of another DSCH transport channel because of increment of the traffic volume on DCH transport channel.

[0056] The data for a mobile station is transmitted through a DSCH and a DCH transport channels as illustrated on the left side of Fig. 8. When the traffic volume is increased, in other words, is larger than the maximum buffer threshold U_limit, a DSCH transport channel is additionally assigned to the mobile station as described on the right side of Fig. 8.

[0057] Fig. 9 is an exemplary diagram demonstrating a release of the DCH transport channel because of decrement of the traffic volume on DCH transport channel.

[0058] The data for a mobile station is transmitted through a DSCH and a DCH transport channels as illustrated on the left side of Fig. 9. When the traffic volume is decreased, in other words, is smaller than the minimum buffer threshold L_limit, the DCH transport channel is released and the data is transmitted through only the DSCH transport channel as described on the right side of Fig. 9.

[0059] According to a dynamic channel assigning method in accordance with the present invention, an additional DCH channel is assigned to a mobile station when traffic volume of data for the mobile station is increased and therefore channel switching happens. The dynamic channel assigning method prevents quality of service from falling without causing interference to the other mobile stations where the fall of quality of service results from increment of the traffic volume.

[0060] The DCH transport channel is released when the traffic volume is decreased. This dynamic channel assignment makes the communication systems stable and efficient.

[0061] Although the preferred embodiments of the invention have been disclosed for illustrative purpose, those skilled in the art will be appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. A method for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the method comprising the steps of:

   a) measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel;

   b) determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and

   c) if the traffic volume of the data packets for a mobile station is larger than the predetermined value, assigning a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data packets for the mobile station via the DCH transport channel.

2. The method as recited in claim 1, wherein the predetermined value is a value representing a maximum buffer threshold.

3. The method as recited in claim 2, wherein an amount of the part of the data corresponds to subtraction result of the predetermined value from an amount of whole data packets for the mobile station.

4. An apparatus for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the apparatus comprising:

   means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel;

   means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and

   means for assigning, if the traffic volume of the data packets for a mobile station is larger than the predetermined value, a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data packets for the mobile station via the DCH transport channel.

5. The apparatus as recited in claim 4, wherein the predetermined value is a value representing a maximum buffer threshold.

6. The apparatus as recited in claim 5, wherein an amount of the part of the data corresponds to subtraction result of the predetermined value from an amount of whole data packets for the mobile station.

7. A base station for dynamically assigning a channel

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in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the base station comprising:

means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel;
means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and
means for assigning, if the traffic volume of the data packets for a mobile station is larger than the predetermined value, a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data packets for the mobile station via the DCH transport channel.

8. The base station as recited in claim 7, wherein the predetermined value is a value representing a maximum buffer threshold.

9. The base station as recited in claim 8, wherein an amount of the part of the data corresponds to subtraction result of the predetermined value from an amount of whole data packets for the mobile station.

10. A method for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the method comprising the steps of:

a) assigning a mobile station as a target mobile station;
b) measuring a traffic volume of data packets for the target mobile station, wherein the data packets are inputted to the DSCH transport channel;
c) determining whether the traffic volume of the data packets for the target mobile station is larger than a predetermined value;
d) if the traffic volume of the data packets is larger than the predetermined value, assigning a dedicated channel (DCH) transport channel to the target mobile station in order to transmit a part of data for the target mobile station via the DCH transport channel; and
e) repeating the steps a) to d) until the last mobile station is processed.

11. The method as recited in claim 10, wherein the predetermined value is a value representing a maximum buffer threshold.

12. The method as recited in claim 11, wherein an amount of the part of the data corresponds to subtraction result of the predetermined value from an amount of whole data packets for the target mobile station.

13. A method for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the method comprising the steps of:

a) measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel;
b) determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and
c) if the traffic volume of the data packets for a mobile station is larger than the predetermined value, assigning a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data for the mobile station via the DCH transport channel.

14. The method as recited in claim 13, further comprising the step of:

d) transmitting the data packets to the mobile station through the DSCH and the DCH transport channels.

15. The method as recited in claim 14, wherein the predetermined value is a value representing a maximum buffer threshold.

16. The method as recited in claim 15, wherein the step d) including the steps of:

d1) encoding the data packets to generate encoded data packets;
d2) modulating the encoded data packets to provide modulated data packets;
d3) converting the modulated data packets into high frequency transmission signals; and
d4) radiating the high frequency transmission signals through the DSCH and the DCH transport channels.

17. An apparatus for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel

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(DSCH) transport channel, the apparatus comprising:

means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel;
means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and
means for assigning, if the traffic volume of the data packets for a mobile station is larger than the predetermined value, a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data packets for the mobile station via the DCH transport channel.

18. The apparatus as recited in claim 17, further comprising:

means for transmitting the data packets to the mobile station through the DSCH and the DCH transport channels.

19. The apparatus as recited in claim 18, wherein the predetermined value is a value representing a maximum buffer threshold.

20. The apparatus as recited in claim 18, wherein the means for transmitting includes:

means for encoding the data packets to generate encoded data packets;
means for modulating the encoded data packets to provide modulated data packets;
means for converting the modulated data packets into high frequency signals; and
means for radiating converted data packets through the DSCH and the DCH transport channels.

21. A base station for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the base station comprising:

means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel;
means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and
means for assigning, if the traffic volume of the data packets for a mobile station is larger than the predetermined value, a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data for the mobile station via the DCH transport channel.

22. The base station as recited in claim 21, further comprising:

means for transmitting the data packets to the mobile station through the DSCH and the DCH transport channels.

23. The base station as recited in claim 22, wherein the predetermined value is a value representing a maximum buffer threshold.

24. The base station as recited in claim 22, wherein the means for transmitting includes:

means for encoding the data packets to generate encoded data packets;
means for modulating the encoded data packets to provide modulated data packets;
means for converting the modulated data packets into high frequency signals; and
means for radiating converted data packets through the DSCH and the DCH transport channels.

25. A method for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the method comprising the steps of:

a) assigning a mobile station as a target mobile station;
b) measuring a traffic volume of data packets for the target mobile station, wherein the data packets are inputted to the DSCH transport channel;
c) determining whether the traffic volume of the data packets for the target mobile station is larger than a predetermined value;
d) if the traffic volume of the data packets is larger than the predetermined value, assigning a dedicated channel (DCH) transport channel to the target mobile station in order to transmit a part of data for the target mobile station via the DCH transport channel;
e) transmitting the data packets to the target mobile station through the DSCH and the DCH transport channels; and
f) repeating the steps a) to e) until the last mobile station is processed.

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26. The method as recited in claim 25, wherein the predetermined value is a value representing a maximum buffer threshold.

27. A method for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the method comprising the steps of:

a) measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH and the DCH transport channels;
b) determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and
c) if the traffic volume of the data packets for a mobile station is larger than the first predetermined value, assigning an additional DSCH transport channel to the mobile station in order to transmit a part of data for the mobile station via the additional DSCH transport channel.

28. The method as recited in claim 27, further comprising the steps of:

d) determining whether the traffic volume of the data packets for the mobile station is smaller than a second predetermined value if the traffic volume is not larger than the first predetermined value; and
e) if the traffic volume of the data packets for the mobile station is smaller than the second predetermined value, releasing the DCH transport channel.

29. The method as recited in claim 28, wherein the first predetermined value and the second predetermined value are values representing a maximum buffer threshold and a minimum buffer threshold.

30. An apparatus for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the apparatus comprising:

means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH and the DCH transport channels;
means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and
means for assigning, if the traffic volume of the data packets for a mobile station is larger than the first predetermined value, an additional DSCH transport channel to the mobile station in order to transmit a part of data for the mobile station via the additional DSCH transport channel.

31. The apparatus as recited in claim 30, further comprising:

means for determining whether the traffic volume of the data packets for the mobile station is smaller than a second predetermined value if the traffic volume is not larger than the first predetermined value; and
means for releasing the DCH transport channel if the traffic volume of the data packets for the mobile station is smaller than the second predetermined value.

32. The apparatus as recited in claim 31, wherein the first predetermined value and the second predetermined value are values representing a maximum buffer threshold and a minimum buffer threshold.

33. A base station for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from the base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the base station comprising:

means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH and the DCH transport channels;
means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and
means for assigning, if the traffic volume of the data packets for a mobile station is larger than the first predetermined value, an additional DSCH transport channel to the mobile station in order to transmit a part of data for the mobile station via the additional DSCH transport channel.

34. The base station as recited in claim 33, further comprising:

means for determining whether the traffic volume of the data packets for the mobile station is smaller than a second predetermined value if

CID: <EP 1069790A2 I >

the traffic volume is not larger than the first predetermined value; and

means for releasing the DCH transport channel if the traffic volume of the data packets for the mobile station is smaller than the second predetermined value.

35. The base station as recited in claim 34, wherein the first predetermined value and the second predetermined value are values representing a maximum buffer threshold and a minimum buffer threshold.

36. A method for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the method comprising the steps of:

a) assigning a mobile station as a target mobile station;
b) measuring a traffic volume of data packets for the target mobile station, wherein the data packets are inputted to the DSCH and the DCH transport channels;
c) determining whether the traffic volume of the data packets for the target mobile station is larger than a first predetermined value;
d) if the traffic volume of the data packets for the target mobile station is larger than the first predetermined value, assigning an additional DSCH transport channel to the target mobile station in order to transmit a part of data for the mobile station via the additional DSCH transport channel;
e) determining whether the traffic volume of the data packets for the target mobile station is smaller than a second predetermined value if the traffic volume is not larger than the first predetermined value;
f) releasing the DCH transport channel if the traffic volume of data for the target mobile station is smaller than the second predetermined value; and
g) repeating the steps a) to f) until the last mobile station is processed.

37. The method as recited in claim 36, wherein the first predetermined value and the second predetermined value are values representing a maximum buffer threshold and a minimum buffer threshold.

38. A method for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the method comprising the steps of:

a) measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH and the DCH transport channels;
b) determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and
c) if the traffic volume of the data packets for a mobile station is larger than the first predetermined value, assigning an additional DSCH transport channel to the mobile station in order to transmit a part of data for the mobile station via the additional DSCH transport channel.

39. The method as recited in claim 38, further comprising the step of:

d) transmitting the data packets to the mobile station through two DSCH and one DCH transport channels.

40. The method as recited in claim 39, wherein the step d) including the steps of:

d1) encoding the data packets to generate encoded data packets;
d2) modulating the encoded data packets to provide modulated data packets;
d3) converting the modulated data packets into high frequency transmission signals; and
d4) radiating the high frequency transmission signals through two DSCH transport channels and the DCH transport channel.

41. The method as recited in claim 38, further comprising the steps of:

e) determining whether the traffic volume of the data packets for the mobile station is smaller than a second predetermined value if the traffic volume is not larger than the first predetermined value;
f) releasing the DCH transport channel if the traffic volume of the data packets for the mobile station is smaller than the second predetermined value; and
g) transmitting the data packets to the mobile station through the DSCH transport channel.

42. The method as recited in claim 41, wherein the step g) including the steps of:

g1) encoding the data packets to generate encoded data packets;
g2) modulating the encoded data packets to

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provide modulated data packets;

g3) converting the modulated data packets into high frequency transmission signals; and

g4) radiating the high frequency transmission signals through two DSCH transport channels and the DCH transport channel.

43. The method as recited in claim 41, wherein the first predetermined value and the second predetermined value are a maximum buffer threshold and minimum buffer threshold.

44. An apparatus for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the apparatus comprising:

means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH and the DCH transport channels;

means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and

means for assigning, if the traffic volume of the data packets for a mobile station is larger than the first predetermined value, an additional DSCH transport channel to the mobile station in order to transmit a part of data for the mobile station via the additional DSCH transport channel.

45. The apparatus as recited in claim 44, further comprising:

means for transmitting the data packets to the mobile station through two DSCH and one DCH transport channels.

46. The apparatus as recited in claim 45, wherein the means for transmitting includes:

means for encoding the data packets to generate encoded data packets;

means for modulating the encoded data packets to provide modulated data packets;

means for converting the modulated data packets into high frequency transmission signals; and

means for radiating the high frequency transmission signals through two DSCH transport channels and the DCH transport channel.

47. The apparatus as recited in claim 44, further comprising:

means for determining whether the traffic volume of the data packets for the mobile station is smaller than a second predetermined value if the traffic volume is not larger than the first predetermined value;

means for releasing the DCH transport channel if the traffic volume of the data packets for the mobile station is smaller than the second predetermined value; and

means for transmitting the data packets to the mobile station through the DSCH transport channel.

48. The apparatus as recited in claim 47, wherein the first predetermined value and the second predetermined value are values representing a maximum buffer threshold and a minimum buffer threshold.

49. The apparatus as recited in claim 47, wherein the means for transmitting includes:

means for encoding the data packets to generate encoded data packets;

means for modulating the encoded data packets to provide modulated data packets;

means for converting the modulated data packets into high frequency transmission signals; and

means for radiating the high frequency transmission signals through the DSCH transport channel.

50. A base station for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the base station comprising:

means for measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH and the DCH transport channels;

means for determining whether the traffic volume of the data packets for each of the mobile stations is larger than a first predetermined value; and

means for assigning, if the traffic volume of the data packets for a mobile station is larger than the first predetermined value, an additional DSCH transport channel to the mobile station in order to transmit a part of data for the mobile station via the additional DSCH transport channel.

ID: <EP 1069790A2 I >

51. The base station as recited in claim 50, further comprising:

means for transmitting the data packets to the mobile station through two DSCH and one DCH transport channels.

52. The base station as recited in claim 51, wherein the means for transmitting includes:

means for encoding the data packets to generate encoded data packets;
means for modulating the encoded data packets to provide modulated data packets;
means for converting the modulated data packets into high frequency transmission signals; and
means for radiating the high frequency transmission signals through the DSCH transport channel.

53. The base station as recited in claim 50, further comprising:

means for determining whether the traffic volume of the data packets for the mobile station is smaller than a second predetermined value if the traffic volume of the data packets for the mobile station is not larger than the first predetermined value;
means for releasing the DCH transport channel if the traffic volume of the data packets for the mobile station is smaller than the second predetermined value; and
means for transmitting the data packets to the mobile station through the DSCH transport channel.

54. The base station as recited in claim 53, wherein the first predetermined value and the second predetermined value are values representing a maximum buffer threshold and a minimum buffer threshold.

55. The base station as recited in claim 53, wherein the means for transmitting includes:

means for encoding the data packets to generate encoded data packets;
means for modulating the encoded data packets to provide modulated data packets;
means for converting the modulated data packets into high frequency transmission signals; and
means for radiating the high frequency transmission signals through the DSCH transport channel.

56. A method for transmitting data packets in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel and a dedicated channel (DCH) transport channel, the method comprising the steps of:

a) assigning a mobile station as a target mobile station;
b) measuring a traffic volume of data packets for the target mobile station, wherein the data packets are inputted to the DSCH and the DCH transport channels;
c) determining whether the traffic volume of the data packets for the target mobile station is larger than a first predetermined value;
d) if the traffic volume of the data packets for the target mobile station is larger than the first predetermined value, assigning an additional DSCH transport channel to the mobile station in order to transmit a part of data for the target mobile station via the additional DSCH transport channel;
e) determining whether the traffic volume of the data packets for the mobile station is smaller than a second predetermined value if the traffic volume is not larger than the first predetermined value;
f) releasing the DCH transport channel if the traffic volume of the data packets for the mobile station is smaller than the second predetermined value; and
g) repeating the steps a) to d) until the last mobile station is processed.

57. The method as recited in claim 56, further comprising the step of:

h) transmitting the data packets to the target mobile station.

58. The method as recited in claim 57, wherein the step h) including the steps of:

h1) encoding the data packets to generate encoded data packets;
h2) modulating the encoded data packets to provide modulated data packets;
h3) converting the modulated data packets into high frequency transmission signals; and
h4) radiating the high frequency transmission signals.

59. The apparatus as recited in claim 56, wherein the first predetermined value and the second predetermined value are values representing a maximum buffer threshold and a minimum buffer threshold.

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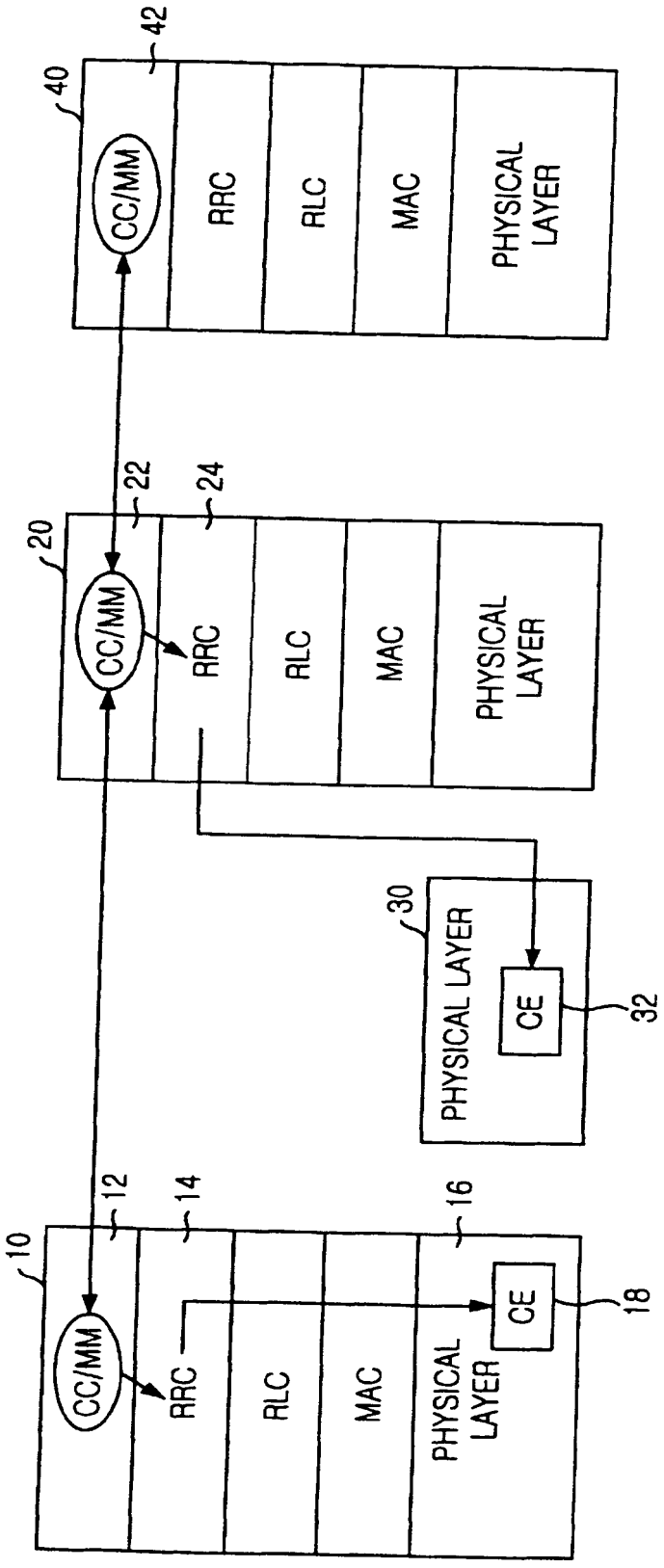

FIG. 1
(PRIOR ART)

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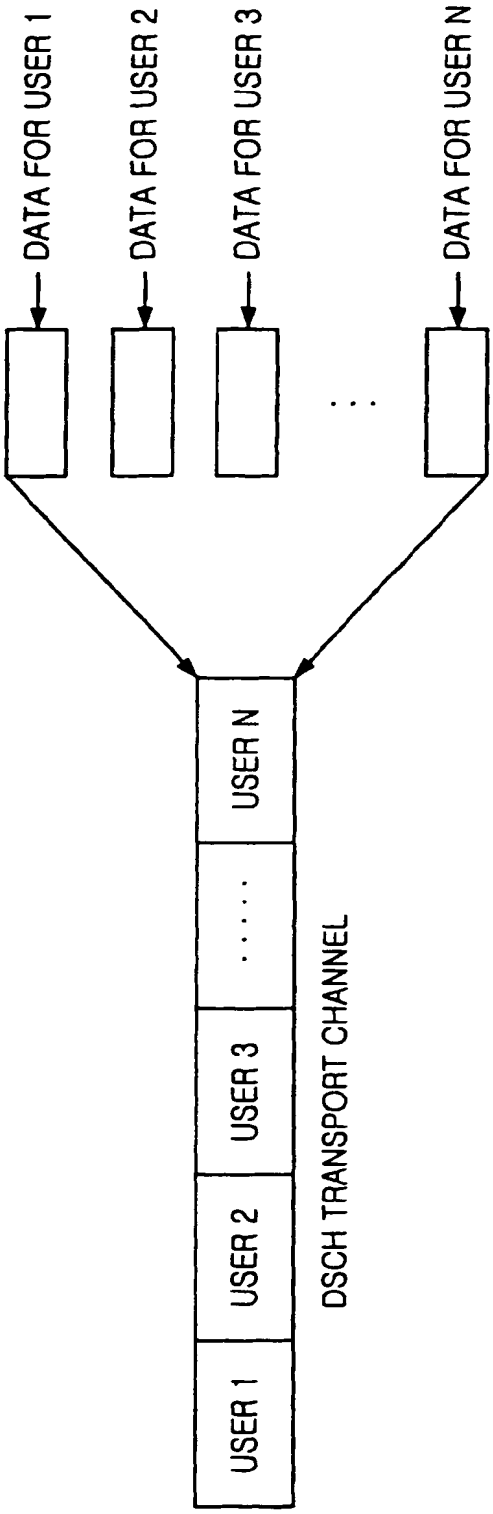

FIG. 2
(PRIOR ART)

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FIG. 3A

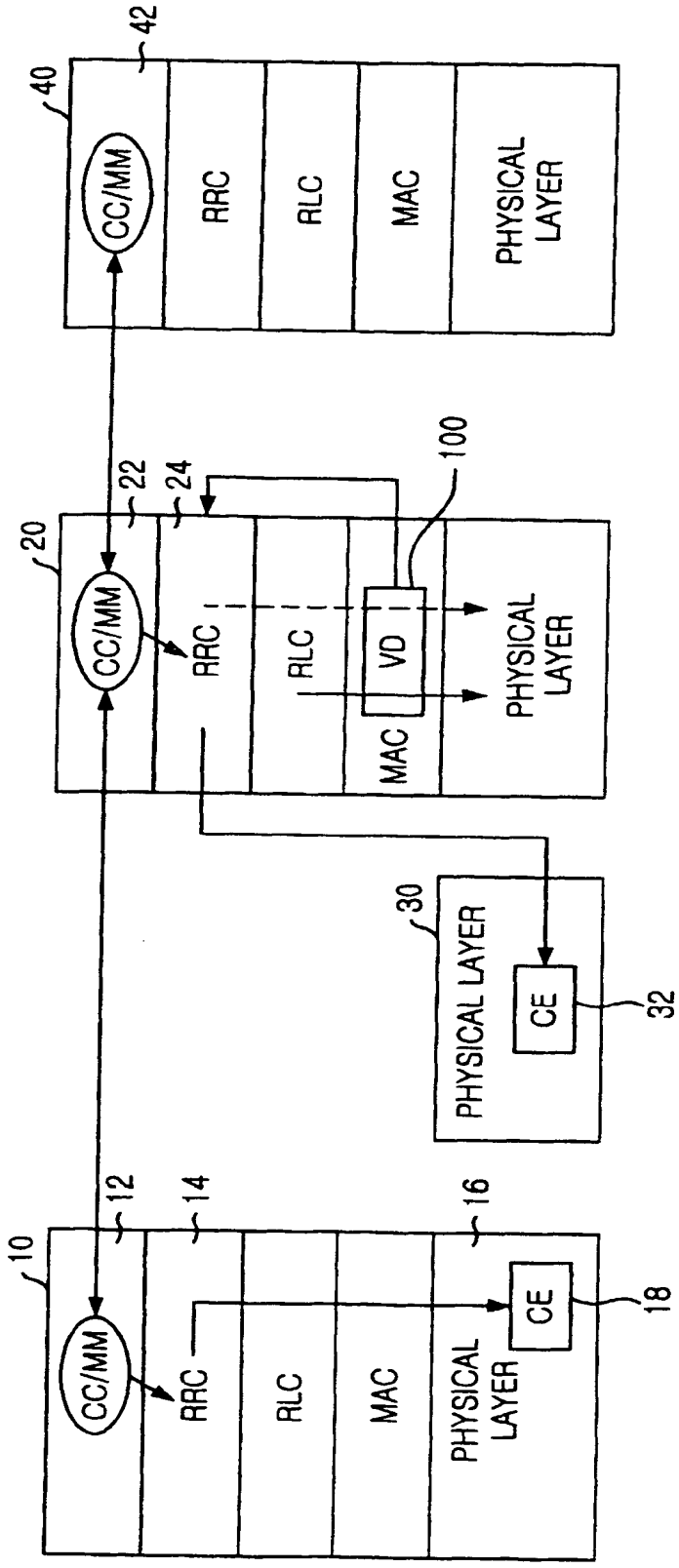

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FIG. 3B

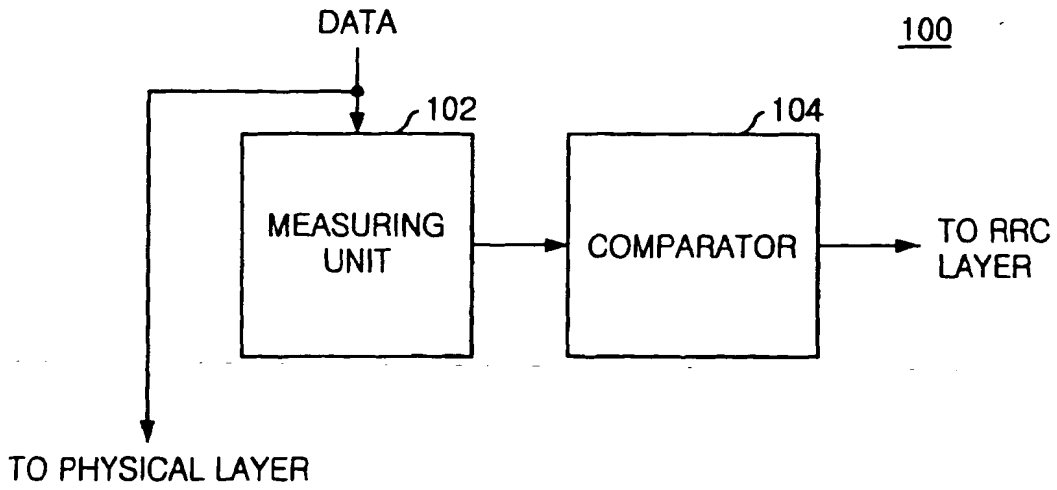

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FIG. 4A

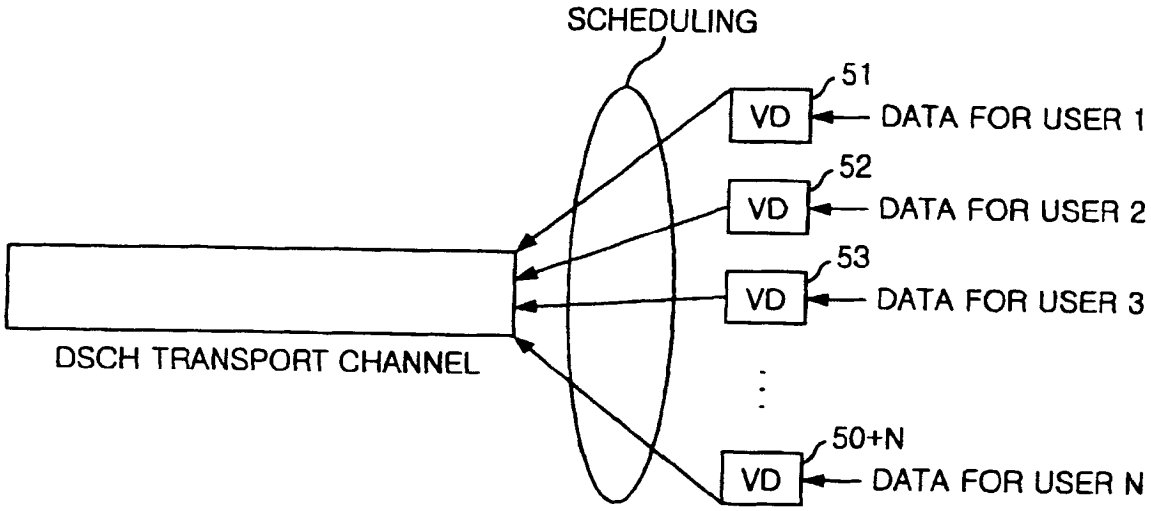

FIG. 4B

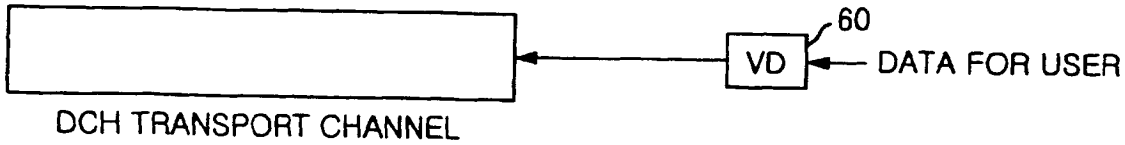

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FIG. 5

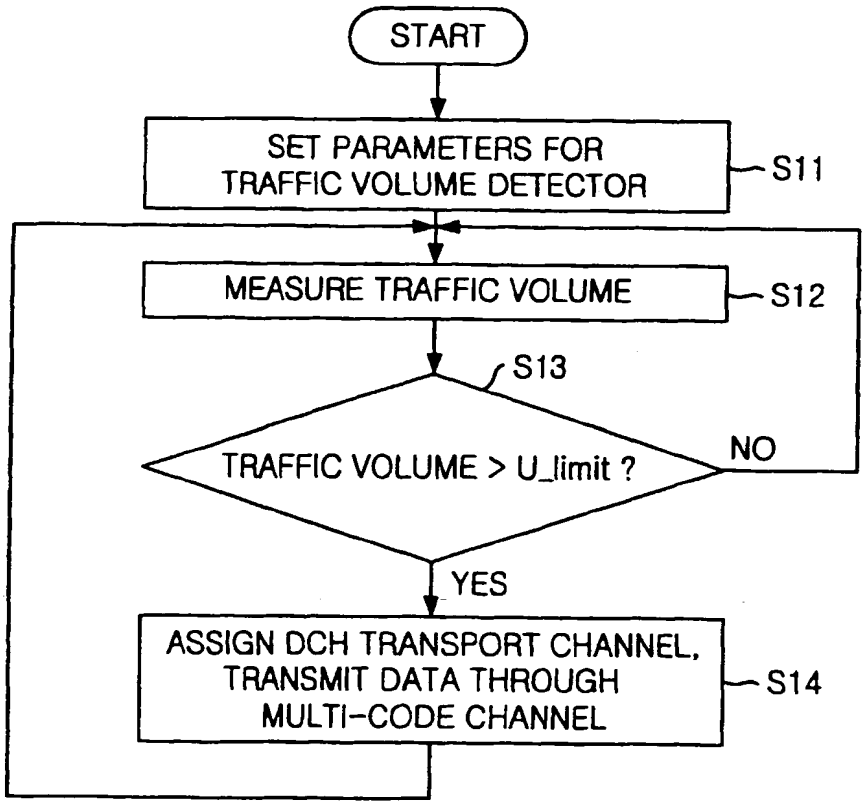

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FIG. 6

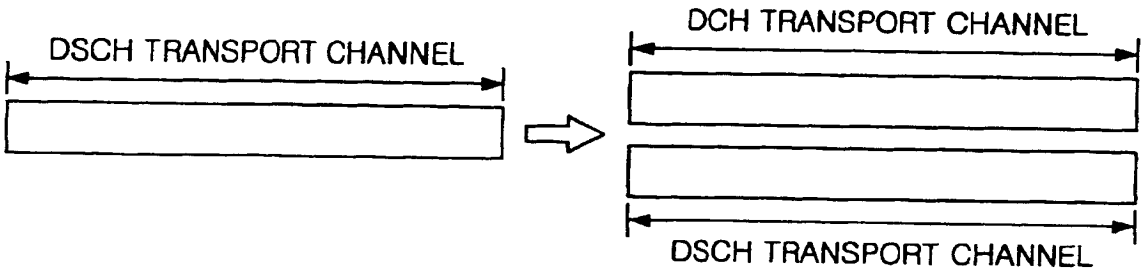

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FIG. 7

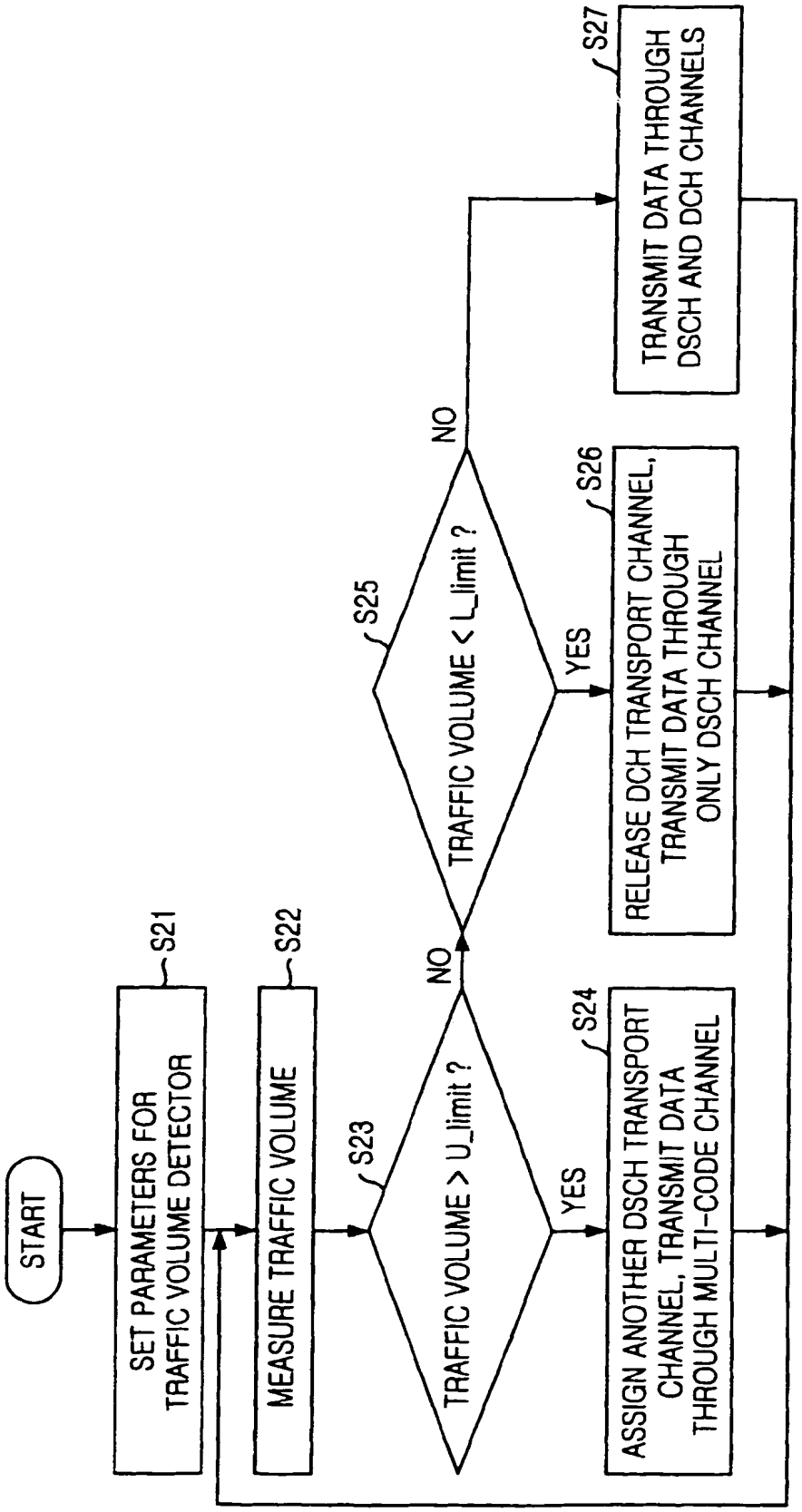

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FIG. 8

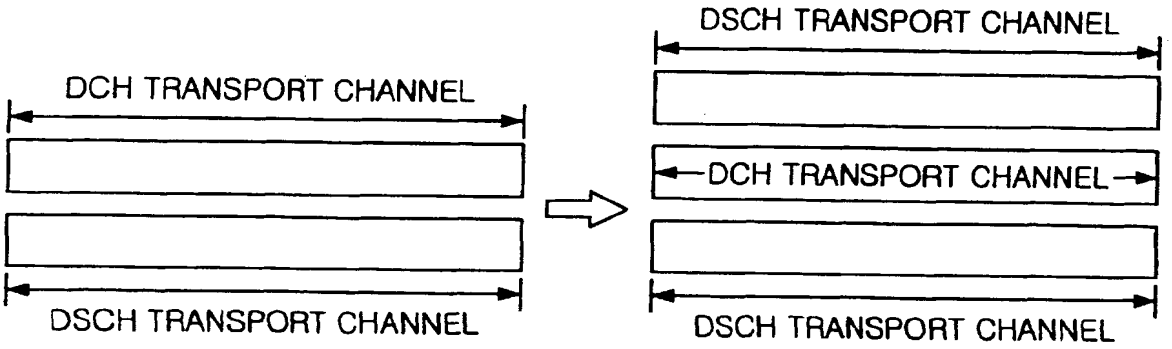
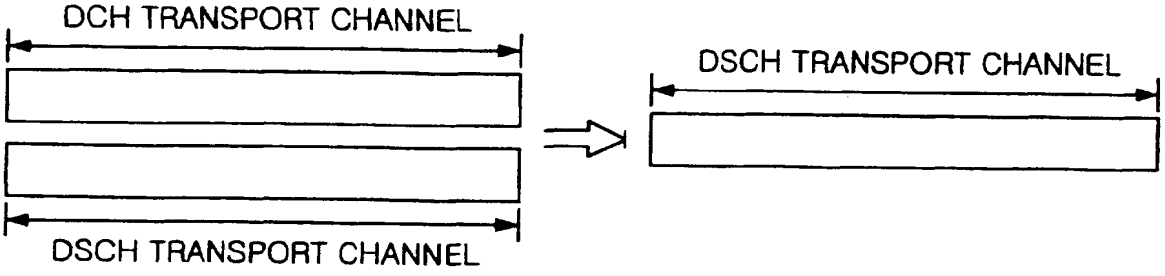


FIG. 9



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(19) Europäisches Patentamt
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(11) EP 1 069 790 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
02.07.2003 Bulletin 2003/27

(43) Date of publication A2:
17.01.2001 Bulletin 2001/03

(21) Application number: **00305798.1**

(22) Date of filing: **10.07.2000**

(51) Int Cl.[7]: **H04Q 7/22**, H04L 12/56

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **10.07.1999 KR 9927896**

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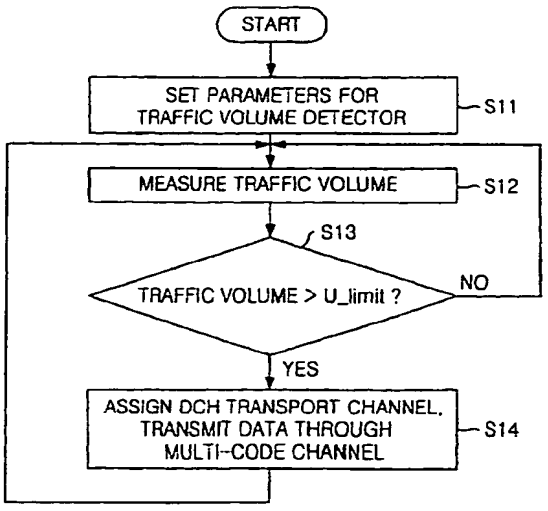
(54) Method and apparatus for dynamically assigning channel in asynchronous mobile communication system

(57) Method and apparatus for assigning a channel dynamically in asynchronous mobile communication system are disclosed. The method for dynamically assigning a channel in asynchronous mobile communication system transmitting data packets from a base station to a plurality of mobile stations through a downlink shared channel (DSCH) transport channel, the method comprising the steps of: a) measuring a traffic volume of data packets for each of the mobile stations, wherein the data packets are inputted to the DSCH transport channel; b) determining whether the traffic volume of the data packets for each of the mobile stations is larger than a predetermined value; and c) if the traffic volume of the data packets for a mobile station is larger than the predetermined value, assigning a dedicated channel (DCH) transport channel to the mobile station in order to transmit a part of data packets for the mobile station via the DCH transport channel.

FIG. 5



EP 1 069 790 A3

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 May 2003	Standaert, F

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